

ISS and Human Research Project Office Highlights

March 26, 2010

ISS Research Program

Science operation for CVB begin on ISS in LMM

Science operations for CVB (Constrained Vapor Bubble, first LMM science payload) began at approximately 1930 GMT on day 081. After solving some initial problems associated with positioning the vapor bubble in the correct position, the collecting of science data on the first day followed the original text matrix/plan. Initially the bubble was found on the wrong side of the cooler and not observable. This was corrected by nucleating an additional vapor bubble in the glass portion of the cuvette by raising the input heat power to 0.8 watts. Since the volume of liquid is approximately a constant, the required initiation of the bubble on the heater side of the cooler caused the initial bubble to collapse.

The quality of the imaging and data collection compare favorably with ground testing. The initial results clearly demonstrated the effects of gravity on an ideal heat pipe system. Based on the observable length of the capillary liquid flow region, removing the effect of gravity appeared to increase liquid flow due to interfacial phenomena and thereby performance. Numerical confirmation requires the complete analyses of the recorded data. No oscillations were observed at a power input of 2 watts. Therefore, the system in micro-gravity appeared more stable. Based on these initial results, we predict successful completion of the 30 mm Pentane filled CVB module (first of four), unless some new unforeseen problem arises. Operations are scheduled through day 88 (March 29). The equipment and software developed by ZIN Technologies operated as expected from ground testing. Thanks to the Cadre, Planners, and especially the ISS crew for the successful start of science operations with the LMM microscope system. (POC: MAH/Ronald Sicker, (216) 433-6498).

MDCA/FLEX completes five tests points on ISS.

Multi-use Droplet Combustion Apparatus' Flame Extinguishment Experiment (MDCA/FLEX) achieved five test points on Friday, March 19, 2010, satisfying two elements of the science matrix. Methanol fuel was run in a 15 percent oxygen in nitrogen atmosphere at 1 atm pressure. All five achieved good ignition and most stayed within the field of view of the HiBMS (High Bit-depth Multi-Spectral) camera. Quenching and radiative extinction were observed. Two additional test points from the science matrix were achieved on Tuesday, March 23, 2010 plus a bonus run was accomplished. These latter test points used the same chamber environment as for the former tests but used n-heptane as the working fuel. Radiative and Damkholer extinction was observed. To date, 43 test points of a total of 199 planned and additional test points have been accomplished. An on-orbit fuel change-out will be to be scheduled in the next weeks. Operations for the week of March 29 include the following activities: (POC: J. Mark Hickman, (216) 977-7105)

ProSilica cameras delivered for ACME.

ProSilica cameras for Advanced Combustion via Microgravity Experiments (ACME) have been delivered and found to function with the driver boards in early testing. The Science Compliance

Matrix continues to be edited for content and format in preparation for the Requirements Definition Review (RDR). Most major subsystems have been tested at the breadboard level and have been found to be feasible. After the RDR, emphasis will be on integrating the subsystems to the system level for further tests. The engineering team is currently shifting focus from preliminary breadboard testing to preparation of project documents in preparation for the early May RDR (a combination of a System Requirements Review and a System Definition Review.) The tentative dates for the RDR are May 5-7, 2010, at the Glenn Research Center. POC: J. Mark Hickman, (216) 977-7105)

Smoke Aerosol Measurement Experiment-Reflight (SAME-R) held SR/DR kickoff. The SAME-R System Requirements/Design Review (SR/DR) kickoff was held on March 19, 2010. A brief overview of the system and the system of interest within the scope of the review were presented to the SR/DR board members. The SR/DR Chair, Deborah Niemira, gave review assignments to the discipline engineers and quality representatives. A risk analysis is being performed and will be included with the SR/DR presentation materials. POC: J. Mark Hickman, (216) 977-7105)

Materials International Space Station Experiment 8 (MISSE 8) Flight Samples prepared . At the request of the MISSE 8 principal investigator, Phil Jenkins of the Naval Research Laboratory, 24 passive samples have been prepared, pre-flight characterized, and submitted for possible inclusion on MISSE 8. These samples were requested, as it is anticipated that there may be extra space on the zenith facing tray of MISSE 8. Kim de Groh and Bruce Banks prepared samples and mounted them in 11 individual Al-holders, which can be taped directly to the MISSE tray. The samples include various polymers (fluorinated ethylene propylene (FEP), Kapton H, clear polyimide (CP1)) and pyrolytic graphite for either atomic oxygen erosion yield or tensile property characterization. This work is supported by the International Space Station Research Project (POC: RES/Kim K. de Groh, 3-2297)

Webcast presented on microgravity.

There's plenty of gravity on the space station! This was one of the concepts presented during a live webcast on microgravity by Dick DeLombard (NCSER) and Dennis Stocker (REC). The March 24 webcast (www.nasa.gov/offices/education/programs/national/nes/home/microg-detail.html <<http://www.nasa.gov/offices/education/programs/national/nes/home/microg-detail.html>>), which will be archived on the web, included a presentation by DeLombard followed by a Question and Answer session where both experts addressed questions from the virtual audience of students and teachers at the NASA Explorer Schools. (POC: MAH/Nancy Hall, (316) 433-5643).

DIME and WING student experiments are dropping in the 2.2. Second Drop Tower.

There has been a relatively high amount of discussion with the Dropping in a Microgravity Experiment (DIME) and What If No Gravity? (WING) teams as the delivery deadline (mid-March) approaches for the WING experiments and as DIME teams need to be finalizing their designs and finishing the construction and testing by the first week of April.

Four experiments were received at NASA for the DIME and WING projects. Two WING experiments have been received to date, one from Exeter, Pennsylvania and one from Dallas,

Pennsylvania. Two DIME Tier III experiments were received from the Troy High School in Troy, Michigan. The first experiment to be received, the Balanced Forces in a Microgravity Environment from Luzerne Intermediate Unit #18, Wyoming Area Secondary Center in Exeter, PA was dropped on March 15, 2010 in the 2.2 Second Drop Tower with satisfactory results. The video and photographs taken during, before and after the drop are being sent to the team for their analysis. The team will then submit a final report of their findings to NASA to complete this activity. DIME and WING are being funded by the Teaching from Space Office at JSC. (POC: MAH/Nancy R. Hall (216) 433-5643



Balanced Forces in a Microgravity Environment experiment

SAME-R Systems Requirements/Design Review Plan has been written.

Smoke Aerosol Measurement Experiment-Relflight (SAME-R) plan for the Systems Requirement/Design Review has been written and is in signature cycle. The technical review kickoff is scheduled for March 19, 2010 with the main review scheduled for 26 March. Deborah Niemira is the review Chair. (POC: J. Mark Hickman, (216) 977-7105)

Human Research Program

Dynamic Measurements Group visits GRC for seminar

The GRC Exercise Countermeasures Project (ECP) Manager hosted a dinner seminar and a tour of the Exercise Countermeasures Lab for 22 visitors from the Dynamic Measurements Group (of northeastern Ohio) on March 10, 2010. The seminar focused on dynamic measurement applications and sensors development for ECP, including accelerometry for activity monitoring during EVA, and a novel force sensor currently being used on the International Space Station in the Harness Station Development Test Objective. (POC: MAH/Gail Perusek (216) 433-8729)